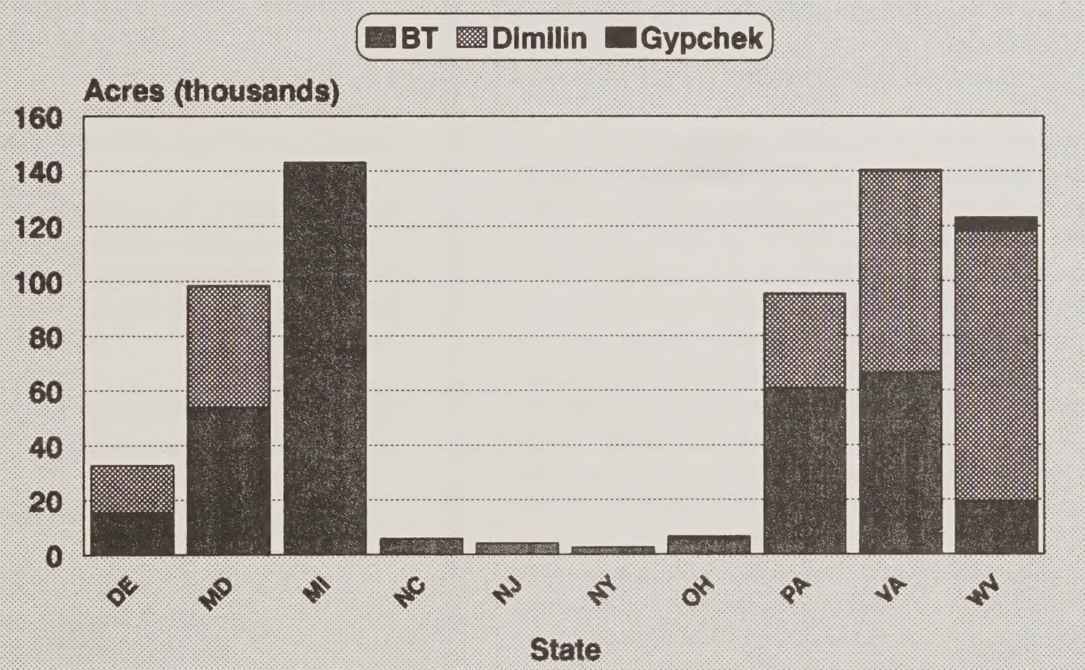
Gypsy Moth News

Issue No. 36 September 1994

Insecticide Use in Gypsy Moth Suppression Projects - 1994



Source: GMDigest, Forest Health Protection, Morgantown, WV.

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From the Editor

1968, the National Gypsy Moth Advisory Council was established to bring together concerned regulatory agencies, organizations, and individuals for the purpose of organizing a major effort to address the gypsy moth problem. The original council was reorganized as the National Gypsy Moth Management Board in 1978 with the intent of serving as a coordinating body for all gypsy moth activities in the U.S. By 1982, guidelines for the Board were changed to reflect more of an advisory role and to act as a focal point for National concerns about gypsy moth. The National Gypsy Moth Management Board has an Executive Committee which functions to conduct the official business of the Board including the arrangements for an annual meeting of members--the National Gypsy Moth Review. Members of the Board include State and Federal pest specialists, industry representatives, and other concerned individuals. Membership is open to anyone and is granted through a simple request to the Executive Committee or by attending the Review . October 30 - November 3 of this year, Portland, Oregon, will be the site of another National Gypsy Moth Review.In

The Review itself, is a jamboree of gypsy moth enthusiasts. Presentations, posters, displays, and meetings combine to offer the participant a variety of information ranging from research updates to technology development. The Review consists largely of formal presentations. These are reproduced in a Proceedings available after each Review. The Proceedings offer an interesting perspective on gypsy moth activities over the past 20+ years. Looking back over the past 10 years, one finds the content of the Proceedings are weighted quite heavily in favor of presentations concerning the effectiveness of the bacterial insecticide, *B.t.*, the effectiveness of Dimilin, survey technology, tree impact assessments, and public education programs. A smattering of presentations have been about Gypchek, the viral insecticide, parasites and predators, and evaluation of silvicultural techniques to minimize damage. This year's agenda includes eradication and regulatory presentations, and an eye towards the Asian gypsy moth.

If I had a criticism of the Review, it would be over the lack of publicity. This annual gathering of several hundred experts and scientists revolving around a forest pest of national significance should be the focus of more media attention. I think it behooves the Board's Executive Committee to help the media get information from the Review, and do what it can to invite media participation. It's a significant meeting. Topics are discussed that affect many people across the country. It's up to the Executive Committee to help tell the story.

-DBT

LETTERS TO THE EDITOR

Dr. G. Bernon, Cape Cod, Massachusetts, writes:

"Article on insecticides was interesting but implies that use started in 1970, or for some reason discussion only needed to start at that date. The omission of any mention of DDT use to eradicate the gypsy moth for about ten years during the 1940s and 1950s may not be a proud moment in USDA history, but it should not have been ignored. In 1955 alone (see enclosed 1955 Annual Report of Gypsy Moth Control by USDA Agriculture Research Service, Plant Pest Control Branch), more acres were sprayed with DDT for gypsy moth than in any year on the graph except 1990-1."

Daniel B. Twardus responds:

The charts and tables presented in the June issue were not intended to be historically complete. Summaries were developed based upon reliable sources of data which we have used to construct the GMDigest. Your comment is correct. Thousands of forest acres were sprayed with DDT in the early years of gypsy moth control. During the late 1800's and early 1900's, pesticides such as Paris green and lead arsenate were used in attempts to eradicate the gypsy moth. DDT use began in the 1950's. In retrospect, the use of DDT can be questioned, but it should be remembered that the early use of this pesticide occurred before there was expressed concern about environmental effects, and the accumulation of DDT in the food chain was unknown. Ironically, one factor that made DDT so effective, its long residual properties, caused its demise and restriction against similar pesticides.

Harry R. Bollinger, Fort Wayne, Indiana, writes:

"Home owner's suggestions for gypsy moth control; explanation of population cycles and how the virus or natural controls work (rise and fall of populations); and essentials of good control of gypsy moth by *B.t.*, Public-spraying of acres by helicopter."

Dennis A. Haugen, Entomologist with the USDA Forest Service in St. Paul, MN, responds:

In answer to your first request, there are a few extension publications on this topic, but these are for "generally infested" areas. Indiana is currently ahead of the leading edge. The small population detected in the Fort Wayne area is being treated this year to "eradicate" the population. Right now, the recommendation for homeowners in Indiana is not to bring gypsy moths into the State if they visit Michigan or any of the infested States in the Northeast. They should not attempt to use pheromone traps because this would interfere with the detection trapping program. I've enclosed a page on Suppression and Eradication prepared by the National GM EIS Team and a new publication from the Minnesota Extension Service that addresses "Eradication vs. Management".

Your second request was just addressed in the "Gypsy Moth News", Issue 34, in the article "Dynamics of gypsy moth predators, parasites, and pathogens".

It is difficult to give a short answer to your third request. Reading an Environmental Assessment of a Cooperative Gypsy Moth Project may be useful. First, you start with detection and delimit trapping to delineate the spot. Aircraft need to be calibrated before the spraying. Life stage of the gypsy moth should be monitored so you know when the appropriate stage is present to conduct the spraying. While spraying, you must ensure proper weather conditions so the spray gets to the target. Then the project is evaluated with more trapping to see if the objective of eradication is accomplished.

A "Gypsy Moth Management Plan for Indiana" is being developed. Hopefully, this will address many of the issues related to gypsy moth in Indiana. Phil Marshall and Gayle Jansen (Indiana DNR) are leading the committee.

McManus Joins GMNews

Dr. Michael L. McManus, Entomologist, with the USDA Forest Service, Northeastern Forest Experiment Station in Hamden, CT, has just joined the staff of the Gypsy Moth News as an Assistant Editor for Research Activities.

Defoliation and Thinning Effects on Gypsy Moth Predators

Rose-Marie Muzika

Although forests of eastern North America have been studied for decades, much remains unknown about the inherent biological diversity in these forests. In particular, information describing diversity and populations of forest arthropods is lacking. In addition to understanding the biotic components in these forests, there is a need to learn more about the effects of gypsy moth defoliation on varied forest fauna.

Baseline data taken in 1989 on 16, 20- to 30-acre stands on the West Virginia University Forest indicate that mixed hardwood and oak forests support abundant and diverse populations of ground dwelling invertebrates. Using pitfall traps--a relatively unsophisticated technique wherein everything that falls into an approximately 1 liter container containing propylene glycol is trapped--we sampled carabids, phalangids, spiders, and ants. The common thread through these is that they are potential predators of gypsy moth (Smith and Lautenschlager 1978). A total of 204 traps was sampled each week for 11 weeks from early May to mid-July. The study continued from 1989 to 1992. The extremely tedious tasks of counting and identifying each individual are still underway for many of the samples.

In the winter of 1989, eight of the sixteen stands were thinned, and in 1990 and 1991, six of the stands were defoliated by gypsy moth, presenting an ideal opportunity to assess the impact of both types of disturbance on potential predators and overall species richness and diversity. Stands were categorized into one of four groups:

- **C** (control, i.e. unthinned and undefoliated)
- **T** - thinned
- **D** - defoliated
- **DT** - defoliated and thinned

Spiders represented the most abundant of the arthropods collected. In 1989, 13,284 individual spiders were identified, representing 136 species. Many of the individuals were juvenile or otherwise unidentifiable to species, so it is likely that the actual species diversity and richness exceeds our estimates. In 1990, 15,638 individuals and 181 species were identified and in 1991, 22,842 individuals and 212 species were collected. Ants, too, were very abundant. Total ants collected in 1989, 1990, and 1991 were 16,148, 14,658, and 12,285, representing 28, 22, and 25 species, respectively.

Spiders and phalangids increased in all stand types and with each year. Spiders steadily increased in all four groups, but greatest increases from 1989 to 1991 in total individuals occurred in DT and C stands, with 77 percent and 86 percent increases, respectively. Phalangid populations rose 131 percent in T stands and 123 percent in DT stands, suggesting that thinning may provide a favorable habitat. Increases in D and C stands were 25 percent and 58 percent of 1989 data, respectively. For both these groups, the cumulative disturbance of thinning and defoliation corresponded with substantial population increases.

Unlike spider and phalangid populations, total number of ants and carabids decreased each year. For ants, D stands decreased the most (35 percent), and T stands decreased the least (14 percent) from 1989 to 1991. Carabid data are not yet available for 1991 samples, but between 1989 and 1990 there was a 65 percent reduction in number of carabids collected in DT stands, a 35 percent reduction in D stands, and 21 percent decrease for C and T stands. For these insects, the combination of defoliation and thinning appear to be detrimental to populations.

Small mammals were also captured in the pitfall traps. Masked shrew, *Peromyscus*, (white-footed mice and deer mice), and red-backed vole were the three most abundant small mammals present, and these species are predators of gypsy moth pupae. White-footed mice, in particular, have been shown to be a major factor in gypsy moth late-larval and pupal mortality (Campbell and Sloan 1977), particularly at low gypsy moth population densities (Elkinton *et al.* 1989).

In 1990, captures of *Peromyscus*, red-backed vole, and masked shrew increased, irrespective of the treatment. In 1991, masked shrews increased in all stand types, but *Peromyscus* and red-backed voles decreased everywhere. In defoliated stands, *Peromyscus* captures declined 83 percent in 1991 and 93 percent in 1992, and there were no red-backed voles trapped in either of those years. Given wide variation among years and within stands, it may be premature to establish conclusions about the treatment effects on small mammal populations, however.

Climatic variability, food availability, and quality are among the many factors that account for changes in populations of invertebrates and small mammals. Forest management practices and gypsy moth defoliation may also influence populations, particularly through habitat modification. At this point in time, it is difficult to assess which factors are most critical. The predation potential of invertebrates under these conditions has not been determined; but the small mammal predation in these stands is currently being assessed. Continued research into the questions of impact of predators on gypsy moth populations, and the ecological consequences of silvicultural thinnings and of gypsy moth defoliation will provide greater understanding of the biological complexities of forests in eastern North America.

Invertebrate/ Small Mammal	Control	Defoliation	Defoliation + Thinning	Thinning
Spiders	+	+	+	+
Phalangids	+	+	+	+
Carabid beetles	-	-	-	-
Ants	-	-	-	-
Peromyscus	-	-	-	-
Red-backed vole	-	-	-	+
Masked shrew	-	+	+	+

Table 1. Overall change in pitfall captures of some gypsy moth predators as affected by defoliation and thinning. A '+' (increase) or '-' (decrease) in the cell for phalangids, spiders and ants is based on results of 1991 sampling compared to 1989 data; carabid results are based on 1990 data compared with 1989; and small mammal data were based on the trap results from 1992 compared with 1989. Statistical analysis of the data has not been completed.

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Campbell, R.W. and R.J. Sloan. 1977. Natural regulation of innocuous gypsy moth populations. Environmental Entomology 6:315-322.

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Smith, H.R. and R.A. Lautenschalger. 1978. The predators of the gypsy moth. US Dept. Agric., Agric. Inf.

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Current Status of Mimic

Richard C. Reardon and Win McLane

The microbial insecticide, *Bacillus thuringiensis* var *kurstaki,* and the insect growth regulator, Diflubenzuron (Dimilin[R]), are the only insecticides used to suppress defoliating populations of gypsy moth as part of the Federal and State cooperative suppression programs. A third insecticide, Gypchek, the nucleopolyhedrosis virus product, is in limited non-commercial production and is currently only available for use in environmentally sensitive areas.

The development and use of more environmentally compatible insecticides for managing species of forest defoliators has been identified as a high priority for the USDA Forest Service. The growth regulator manufactured by Rohm and Haas RH-5992 (Mimic[R]) offers this opportunity in suppression/eradication programs for European and Asian gypsy moth as well as for other forest defoliators (e.g. spruce budworms).

During 1988-1991, the experimental insect growth regulator, Mimic[R], containing the active ingredient, Tebufenozide, was evaluated against laboratory-reared gypsy moth larvae for efficacy and for rain fastness to oak foliage (McLane, APHIS Reports 1988-1991). It acts by mimicking the insect molting hormone and causes cessation of feeding, premature molting, and death of exposed insects. In 1992, efficacy and residue data were collected for Mimic in Ontario, Canada, in association with field trials against spruce budworm.

Mimic has been given a "fast-track" designation for registration by the U.S. and Canadian Environmental Protection Agencies (EPA's). Rohm and Haas anticipate registration by 1996. An experimental use permit for aerial application of Mimic to 600 acres in 1994 was granted by the US-EPA for field evaluation against gypsy moth. The Canadian Forest Service is interested in using this insect growth regulator for control of spruce budworm and will be conducting efficacy, residue, and nontarget studies on coniferous species in 1994 (Cadogan and Sundaram, pers. comm.).

In 1994, a cooperative study was conducted using Mimic against gypsy moth populations in eastern Ohio (McLane et al 1994). A series of small plots, each <125 acres, were established with four replicates per three treatments: Mimic .03 lb AI/acre, Mimic .06 lb AI/acre, untreated controls. An aircraft equipped with flat fan nozzles (8004 tips) was used to apply the Mimic. One application of Mimic was applied using the 2F formulation. The spray was applied at 1 gallon of total formulation per acre. One pint of Latron Onatrio CS7 anti-evaporant was mixed with each 100 gallons of spray mix. In addition to the typical efficacy (i.e. larval, pupal and egg mass reduction, defoliation estimates) data, we are also collecting data on: 1) spray deposit on foliage, 2) persistence of residue levels on foliage and litter, 3) nontarget impacts on canopy arthropods, and 4) nontarget impacts on aquatic macroinvertebrates. Preliminary efficacy results are promising, and to date, we have not detected impacts on aquatic macroinvertebrates.

For more information about Mimic, contact:

Dr. Richard Reardon
USDA Forest Service
180 Canfield Street
Morgantown, WV 26505

Phone: 304-285-1566

Literature Cited

McLane, W. and J. Finney. 1988-1991. Laboratory Reports, Otis Methods Development Laboratory. USDA-APHIS Otis ANG Base, MA.

McLane, W., G. Carlson, M. Wimmer, L. Butler, B. Stout, K. Mierzejewski, and R. Reardon. 1994. Evaluation of the insect growth regulator RH-5992 (Mimic) to manage gypsy moth populations: efficacy, residue analysis, deposit assessment and nontarget impacts. Study Plan. 8pp.

About the authors:

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Current Status of Gypchek

Richard C. Reardon and John Podgwaite

The gypsy moth nucleopolyhedrosis virus (NPV) product Gypchek is produced by infecting laboratory-reared larvae and then processing the cadavers to yield a technical powder that contains about 15 percent (by wt.) viral occlusion bodies (OBs). Gypchek is not commercially available, but is produced by the collaborative efforts of two USDA agencies: the Forest Service (FS) and the Animal and Plant Health Inspection Service (APHIS). It is anticipated that in the foreseeable future between 25,000 and 30,000 acre equivalents (AE) will be produced and made available each year. An AE is that amount of Gypchek sufficient to treat an acre; that's 4×10^{11} OBs, or about 10 grams of product.

When Gypchek was registered with EPA in 1978, its performance as an operational pesticide was inconsistent. This was due, in part, to low potency and inadequate ultraviolet light protection afforded foliar deposits. These inadequacies and other formulation and application problems have been addressed through numerous methods improvement and pilot projects conducted through the cooperative efforts of USDA's Agricultural Research Service (ARS), FS, and APHIS; various State Departments of Agriculture and Forestry; and Forestry Canada. As a result of these efforts, the current product is consistently efficacious and, with the continued refinement of a ready-to-use carrier, will be easier to mix and apply.

Our current recommendation for suppression of gypsy moth populations in the range of 300 to 5,000 egg masses per acre is two applications (3 days apart) of 2×10^{11} OBs in one gallon of ready-to-use spray adjuvant (Carrier 244, Entotech, Inc.)/acre. Alternatively, the standard tank mix (Lignosulfonate-molasses-sticker) can be used at the same dose rate and timing, but at 2-gallons/acre. For healthy gypsy moth populations, one can expect population reduction in the range of 60 to 80 percent with sufficient foliage protection to prevent refoliation. For populations in decline, one can expect population reduction in the range of 90-98 percent and foliage protection >85 percent. There is little data on which to base recommendations for control of low density populations (<300 EM/acre). Theoretically, the product should not be as effective against these populations because the generation of secondary viral inoculum that would infect treatment survivors is limited. There have been no controlled field experiments on which to base recommendations for reducing extremely low density populations (<20 EM/acre) to undetectable levels (eradication). However, results of APHIS treatments of several isolated infestations have indicated that at least two applications at either 5×10^{11} or 1×10^{12} OBs/acre would be required to reduce populations to levels that would be difficult to detect.

Gypchek is a species-specific product that was developed for use in environmentally sensitive areas where the applications of broad-spectrum pesticides, including *B.t.* and Dimilin, are not appropriate, e.g., where non-target lepidopteran species are of special concern. However, Gypchek was not developed to replace these pesticides for use over broad geographic areas. In contrast to *B.t.* and Dimilin, which are essentially toxicants that kill gypsy moth larvae relatively quickly, Gypchek's effectiveness is linked to keeping the product alive long enough after application to ensure the infection of early-instar larvae. Thus, Gypchek's performance is greatly diminished by improper storage and formulation, late application, and adverse weather conditions.

The protocol for allocating Gypchek for use is as follows: In September, a letter is forwarded by the USDA Forest Service to all cooperators stating the quantity of Gypchek available for the coming year. A data form is enclosed on which the cooperator is requested to list egg mass counts, size and location of the proposed treatment areas, and the environmental considerations upon which the request for Gypchek is based. The date for response is November 1. The National Center of Forest Health Management in Morgantown, WV serves as the primary contact for information on Gypchek. Site selections are made by a Committee and all the cooperators are contacted in late November concerning the status of their requests. The cooperators receiving Gypchek provide dates of treatment and detailed plot data. This information is summarized and forwarded to the Gypchek processing facility in Ansonia, CT, where Gypchek is packaged and shipped.

About the authors:

Richard is a Program Manager with the USDA Forest Service, National Center of Forest Health Management in Morgantown, WV, and John is a Microbiologist with the USDA Forest Service, Northeastern Forest Experiment Station, in Hamden, CT.

Asian Gypsy Moth Introductions into North America

Terry McGovern

Proposed Asian Gypsy Moth Policy

In response to a request from the Animal and Plant Health Inspection Service, a Science Advisory Panel was formed to address specific questions related to the Asian gypsy moth. These questions included what would be the likely consequences of an introduction into the United States, and what would be an appropriate response based on current information available. An AGM Policy Committee was then formed to propose a clearly defined policy to deal with future introductions of AGM. The following is their proposed recommendations:

1. The Policy Committee recommends that AGM should be regarded as a significant economic pest not known to be currently established in the United States.

2. While operational reactions to both North American gypsy moth and Asian gypsy moth introductions outside of the generally infested area are similar, the programmatic differences implemented to date are justified and should be continued.

3. Exclusionary efforts should be intensified and a regular detection survey should be carried out at all sites at high risk for introduction.

4. When the source of a new Asian gypsy moth introduction into the North American gypsy moth generally infested area is known, such as a specific infested cargo shipment, container, or vessel, aggressive efforts to eradicate the pest should be implemented.

5. Any future change in policy should be "triggered" by advances on the scientific front regarding such issues as DNA identification, population genetics, behavioral traits of hybrids and backcrosses, etc. The AGM Policy Committee recommends that work of this nature be supported with all the necessary means and resources required.

The first known introduction of Asian gypsy moth (AGM) into North America occurred in the Pacific Northwest during the spring of 1991. Canadian inspectors observed newly hatched larvae "ballooning" ashore from egg masses laid on a grain vessel that had just arrived from Russia. Adult trapping conducted later that year resulted in the capture of 17 AGM in Vancouver, 9 AGM in Washington, and 1 AGM in Oregon. The genetic makup of these moths was confirmed to be pure Asian through the use of mitochondrial DNA analysis (mtDNA).

In response to these interceptions, eradication projects were conducted in the spring of 1992. Aerial applications of *Bacillus thuringiensis* (*B.t.*) were made on 40,000 acres in Vancouver, British Columbia; 116,500 acres in Tacoma, Washington; and 8,400 acres in Portland, Oregon. The treatments were followed by 2 years of extensive survey to detect the presence of any surviving AGM. While no AGM were found in 1992, 3 possible hybrids were found in the United States in 1993, and 2 pure AGM and several hybrids were detected in Canada. Further treatments were conducted where needed this past spring and the results of the 1994 trapping program will be used to make a final determination regarding the success of the eradication work. Total project costs are approximately $20 million.

The second AGM introduction occurred on July 4, 1993, near Wilmington, North Carolina. The source of the AGM was a ship chartered by the U.S. military to transport munitions from NATO bases in southern Germany. Hundreds of AGM moths, which emerged from pupae during the voyage, were released when the hold of the ship was opened during the unloading process. Trapping activity resulted in the capture of over 300 moths, which were then tested using both mtDNA and nuclear DNA analysis. The results of the genetic tests indicated that 50 percent of the moths were of the European strain, 2 percent were pure Asian, and the other 48 percent were hybrids.

The U.S. Department of Agriculture and the North Carolina Department of Agriculture immediately started planning for an

eradication project. Aerial applications of *B.t.* and Gypchek were applied to a 140,000-acre treatment block in the spring of 1994. Following these treatments, an extensive delimiting trapping program was implemented to cover an area of approximately 1,600 square miles. Traps were deployed at a density of 25 per mile for a radius of 30 miles out from the introduction site. Results of this trapping indicate that while the treatments were successful, some AGM were detected within the buffer zone surrounding the treatment blocks. Early estimates indicate that additional treatments on about 70,000 acres will be needed in 1995, followed by 2 more years of survey. The total cost of the project is not expected to exceed the $9.45 million originally projected.

Several intercepts of AGM have been made in 1994. Egg masses and larvae were found on military cargos offloaded in both Charleston, South Carolina, and Baltimore, Maryland. This cargo consisted of military trucks and trailers, as well as the household goods and private automobiles of military personnel returning from bases in Germany. A total of almost 1,500 vehicles and household goods were fumigated as a result of these interceptions. Early results from the Nationwide AGM Port Survey, implemented this year by the Animal and Plant Health Inspection Service, indicate that AGM suspects have been found in Baltimore, Maryland; Dover, Delaware; and several other east coast locations. Further DNA testing is needed to confirm these identifications.

The USDA has taken numerous steps to reduce the risk of future introductions at both high-risk origin sites and introduction sites. In addition to the port survey conducted in the United States, an AGM survey program has been established in the Russian Far East. The Forest Service, the Animal and Plant Health Inspection Service, and their Russian counterparts are participating in this cooperative venture to monitor *Lymantria* populations in several important Far Eastern ports. The survey data obtained is being used to help to modify and direct an exclusion program designed to prevent future AGM introductions from Russia. The USDA is also working with both the German government and the U.S. military to reduce the risk of introductions from Europe. An extensive military customs/agriculture preclearance program, which was recently targeted to phase down at this time, has just been recertified to continue agricultural inspections. For more information about Asian Gypsy Moth Policy and Action Alternatives, contact Terry McGovern at 301-436-8247.

About the author:

Terry is an Operations Officer with the USDA Animal and Plant Health Inspection Service, Plant Protection and Quarantine, in Hyattsville, MD.

APHIS AGM Eradication Activities - 1994

State/County/Project	B.t.	Gypchek
North Carolina		
Brunswick and New Hanover Counties (21 sites)	134,432[1]	5,900[2]

[1]Two complete applications and an additional 3rd application at introduction site (Sunny Point Ocean Terminal).
[2]Two applications per site.

Gypsy Moth Suppression in the United States - 1994

Source: GMDigest, Morgantown, WV.

Ownership/State/Site	B.t.	Dimilin	Gypchek	Total acres treated
Cooperative:				
Delaware	15286	17401	0	32687
Maryland	51534	44657	0	96191
Michigan	141893	0	0	141893
New Jersey Agriculture	3104	0	0	3104
New Jersey Forestry	700	0	0	700
Ohio	5650	309	450	6409
Pennsylvania	50946	34929	0	85875
Virginia	44929	67139	0	112068
West Virginia	5422	97823	0	103245
Subtotal Cooperative	**319502**	**262258**	**450**	**582210**
National Forest:				
Allegheny (PA)	9366	0	0	9366
George Washington (VA)	2400	2340	0	4740
Huron-Manistee (MI)	915	0	0	915
Monongahela (WV)	2733	0	4915	7648
Subtotal National Forest	**15414**	**2340**	**4915**	**22669**
Other Federal:				
Blackwater National Wildlife Refuge (MD)	1842	0	0	1842
Fredricksburg/Spotsylvania Nat'l Battfld (VA)	217	0	0	217
Indian Head Naval Surface Warf. Ctr. (MD)	166	0	0	166
Manassas Nat'l Battfld Park (VA)	728	0	0	728
Mason Neck National Wildlife Refuge (VA)	1148	0	0	1148
Prince William Nat'l Park (VA)	1261	0	0	1261
Quantico Marine Base (VA)	2089	2890	0	4979
Quantico National Cemetery (VA)	0	369	0	369
Seneca Indian Nation (NY)	2419	0	0	2419
Shenandoah National Park (VA)	0	524	0	524
Smithsonian Zoo (VA)	400	0	0	400
Subtotal Other Federal	**10270**	**3783**	**0**	**14053**
Slow the Spread:				
Jefferson National Forest (VA)	999	188	500	1687
Jefferson National Forest (WV)	98	0	0	98
North Carolina Department of Agri. (NC)	5225	0	0	5225
Virginia S&PF Lands (VA)	11826	147	0	11973
West Virginia S&PF Lands (WV)	10916	860	0	11776
Subtotal Slow the Spread	**29064**	**1195**	**500**	**30759**
Grand Total	**374250**	**269576**	**5865**	**649691**

Gypsy Moth Eradication in the United States - 1994

Source: USDA APHIS, PPQ, Hyattsville, MD.

State/County/Project	B.t.	Gypchek	Mass Trap	No. of Applications
Iowa				
Polk County, Ivy	90[1]	0	100	3 traps/acre, May-August
Illinois				
Lake County, Old Mill Road	18[2]	0	0	
Lake County, W. Minster	11[2]	0	0	
Lake County, N. Chicago	8[2]	0	0	
Lake County, New Port Twp.	8[2]	0	0	
Cook County, Evanston	4[2]	0	0	
Indiana				
Allen County, St. Joe Road	30[2]	0	0	
Kentucky				
Carroll County, Kings Ridge	0	50[1]	0	
North Carolina				
Watauga County, Boone	0	0	40	16 traps/acre, May-August
Carteret County, Beaufort	0	0	5	16 traps/acre, May-August
Ashe County, Jefferson - North	0	0	10	16 traps/acre, May-August
Ashe County, Jefferson - South	0	0	20	16 traps/acre, May-August
Ohio				
Hamilton County, Cincinnati	0	60[1]	0	
Marion County, Claridon Twp.	0	50[1]	0	
Seneca County, Pleasant Twp.	0	15[1]	0	
Oregon				
Clackamas County, Carver	270[2]	0	0	
Clackamas County, Lake Grove	1.25[1]	0	0	
Multnomah County, Palantine Hills	7[1]	0	0	
Tennessee				
Blount County, Blount	2[1]	0	645	5 acres @ 25 traps/acre; 640 acres @ 36 traps/acre; May-August
Washington				
Lewis County, Centralia	13[2]	0	0	
Pierce County, Steilacoom	18[2]	0	0	
Thurston County, Olympia	5[2]	0	0	
Wisconsin				
Dane County, Cottage Grove	190[1]	0	0	
Dane County, Maple Bluff	0	0	20	9 traps/acre, June-September
Fond du Lac County, Brown Road	0	0	10	9 traps/acre, June-September
Jefferson County, Biederman Road	155[1]	0	0	
Jefferson County, Ft. Atkinson	20[1]	0	0	
Milwaukee County, Doctors Park	0	0	100	9 traps/acre, June-September
Waukesha County, Marriot	0	0	10	9 traps/acre, June-September
Winnebago County, Winchester	590[1]	0	0	
Winnebago County, Oshkosh	330[1]	0	0	
West Virginia				
Jackson County, Kenna	0	0	6176	core-10 traps/acre; 1st ring-3 traps/acre; buff. area-250 meter grid
Jackson County, Ravenswood	0	0	1977	250 meter grid
Kanawha County, Tyler Mountain	0	0	2224	250 meter grid

[1] Two applications; [2] three applications.

Gypsy Moth Treatment Monitoring Data Base Results, 1993

Daniel B. Twardus and Helen A. Machesky

"In a gypsy moth spray project, it's not that we relish the spraying, but that we wish to be rid of the gypsy moth. So how are we doing?"

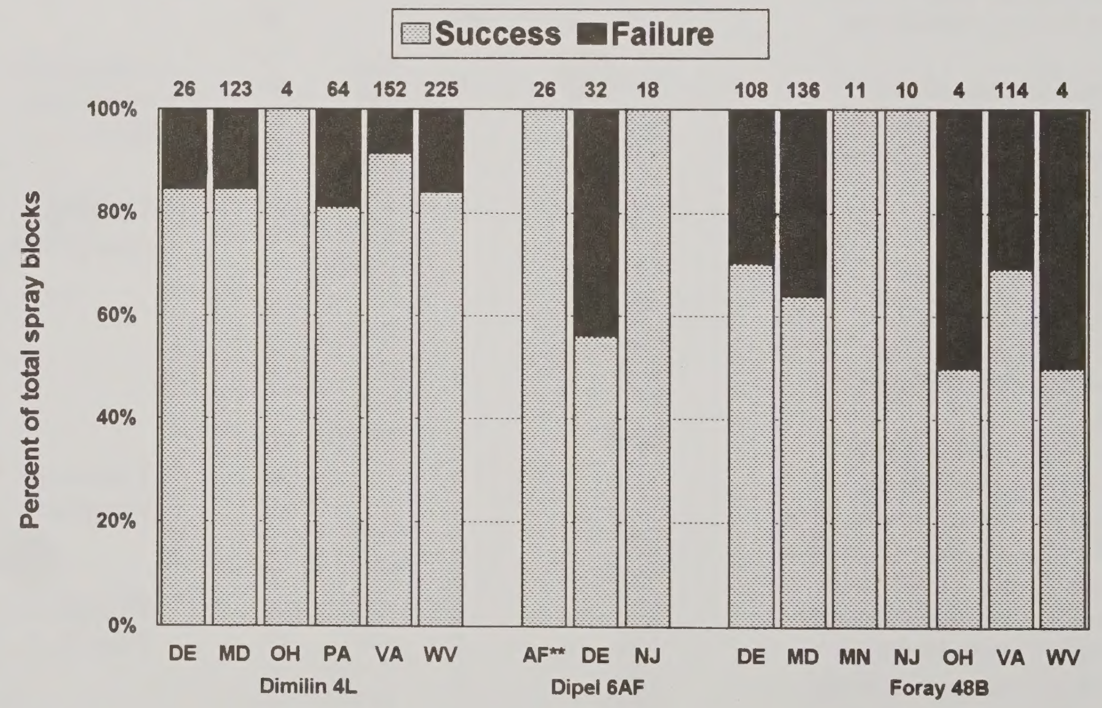
Each year, State and Federal agencies report on the number of acres that have been sprayed to protect forests from gypsy moth damage. That in itself, is one measure of accomplishment. Another, is the effectiveness of spraying. All gypsy moth projects are conducted in order to achieve some objective; for example, reducing populations to a non-damaging level. If we are concerned only with the number of acres sprayed, we are missing part of the story.

Several years ago, the USDA Forest Service began a program to monitor project success. This program, known as the Treatment Monitoring Data Base, is designed to collect information about each gypsy moth suppression project. Information collected includes pesticides used, conditions at the time of treatment, aircraft specifications, and results. At the end of the year, this information is summarized to report upon project results. Where results are less than satisfactory, the information is used to back-track in order to gain insight into what went wrong.

Shown below is an example of results reported from the Treatment Monitoring Data Base for 1993 gypsy moth suppression projects. Here success or failure results are reported in terms of reducing gypsy moth egg mass densities to below 500 egg masses per acre for individual spray blocks. Though this particular objective may not be one used by all States or sites, it is one used within the Treatment Monitoring Program in order to make across the board comparisons.

***How to read the chart.** Numbers above bars are the total number of spray blocks. Post-treatment egg mass densities were collected in over 1,100 spray blocks; therefore, the data is represented as a function of percent of total spray blocks. For example, in Figure 1, DE had a success rate of 85 percent using Dimilin 4L, a 56 percent success rate using Dipel 6AF, and a 70 percent success rate using Foray 48B.*

Treatment Monitoring Data Base Results, 1993*



*Success is defined as having less than or equal to 500 egg masses per acre after treatment.
**AF = Allegheny National Forest.

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